Printing dept

HERPETOLOGICA

Volume 6 1950

TABLE OF CONTENTS

STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE
LIBRARY
MAY 7 1954
MANHATTAN KANSAS

Compiled By

CHARLES E. SHAW

Compiled by Charles E. Shaw

Allen, E. Ross, and Wilfred T. Neill
The Vertical Position of the Pupil in Crocodilians and Snakes....95
The Life History of the Everglades Rat Snake, **Elaphe obsoleta rossalleni**....109
Anderson, Paul
A Record for the Northern Prairie Skink, **Eumeces septentrionalis septentrionalis** (Baird) in Missouri....53
The Greater Five-lined Skink, **Eumeces laticeps** (Schneider), in Kansas....53
A Range Extension for the Ringed Salamander, **Ambystoma annulatum** Cope....55
Auffenberg, Walter
A New Subspecies of the Mud Snake, **Liodytes alleni**....13
Axtell, Ralph W.
Notes on a Specimen of **Sceloporus poinsetti** and its young....80
Banta, Benjamin H.
Record of **Xantusia vigilis** Baird from Southern Nye County, Nevada....34
Burger, Leslie (see Smith, Hobart M.)
Campbell, Howard
Rattlesnakes Tangled in Wire....44
Carl, G. Clifford
The Sharp-tailed Snake in British Columbia....116
Clarke, Robert F.
Notes on the Ornate Box Turtle....54
Darling, Donald M. (see Werler, John E.)
Dundee, Harold A.
Notes on the Type Locality of **Eurycea multiplicata** (Cope)....27
Additional Records of **Hypsiglena** from Oklahoma, with notes on the Behavior and the Eggs....28
The Type Locality of **Elaphe l. laeta** (B & G)....55
An Improved Method for Collecting Living Lizards and Frogs....78
Kinosternon subrubrum hippocrepis (Gray) in Oklahoma....138
(see Glass, Bryan P.)
Firschein, I. Lester
A New Record of **Spea bombifrons** from Northern Mexico and Remarks on the Status of the **hammondii** Group of Spadefoot Anurans....75
Forsyth, J. W. (see Ramsey, L. W.)
Glass, Bryan P., and Harold A. Dundee
Cnemidophorus tesselatus (Say) in Oklahoma....30
Hamilton, W. J., Jr.
Food of the Prairie Rattlesnake....34
Hansen, Richard M.
Sexual Behavior in Two Male Gopher Snakes....120
(see Woodbury, A. M.)
Hardy, Jerry D., Jr., and Yono Mork
A Giant Red Salamander from Maryland....74
Hebard, William B.
Relationships and Variation in the Garter Snakes, Genus **Thamnophis** of the Puget Sound Region of Washington State....97
Hilton, William A.
Review of the Chondrocranium of Tailed Amphibia....125
Dermal Sense Organs of **Stereochilus**....135

Householder, Vic H.
Courtship and Coition of the Desert Tortoise....11
Johnson, Richard M.
Mating Activities Between Two Subspecies of **Elaphe obsoleta**....42
Knowlton, G. F., and A. C. Valcarce
Insect Food of the Sagebrush Swift in Box Elder County of Utah....33
Lewis, Thomas Howard
The Herpetofauna of the Tularosa Basin and Organ Mountains of New Mexico with Notes on Some Ecological Features of the Chihuahuan Desert....1
List, James C., Jr.
Observations on the Courtship Behavior of **Thamnophis sirtalis sirtalis**....71
Livezey, Robert L.
The Eggs of **Acris gryllus crepitans** Baird....139
Lynn, W. Gardner
A Case of Duplication of the Tail in **Plethodon**....81
Maslin, T. Paul
Herpetological Notes and Records from Colorado....89
Mehrtens, J. M.
The Saw Scaled Viper in Captivity....202
Mittleman, M. B.
The Generic Status of **Scincus lateralis** Say, 1823....17
Miscellaneous Notes on Some Amphibians and Reptiles from the Southeastern United States....20
Status of the Name **Hyla septentrionalis**....24
Insular Variation in the Lizard **Sphaerodactylus cinereus**....60
Mork, Yono (see Hardy, Jerry D., Jr.)
Myers, George S.
Status of the Generic Name **Lioheterodon** Applied to Madagascan Serpents....52
Munro, D. F.
Vertical Orientation of the Eye in Snakes....84
Additional Observations on Head-bobbing by Snakes....88
A Possible Instance of Traumatically Accelerated Ecdysis in **Thamnophis**....121
Incubation and Hatching of Eggs of **Coluber c. flaviventris**....122
Juvenile Pattern in a Mature Female **Coluber c. flaviventris**....124
Neill, Wilfred T.
Reptiles and Amphibians in Urban Areas of Georgia....113
(see Allen, E. Ross)
Nelson, Dee Jay
Lampropeltis triangulum gentilis in Montana....41
A Treatment for Helminthiasis in Ophidia....57
Perkins, C. B.
Frequency of Shedding in Injured Snakes....35
Ramsey, L. W., and J. W. Forsyth
Breeding Dates for **Ambystoma texanum**....70
Shannon, Frederick A.
Some Additional Remarks on the Status of the Species **Sceloporus occidentalis**....31
Coluber constrictor mormon—a State Record for Arizona....59
Shaw, Charles E.
Lizards in the Diet of Captive **Uma**....36
The Gila Monster in New Mexico....37

Sinclair, Ralph Mason
Notes on some Salamanders from Tennessee....49
Some Noteworthy Records of Amphibians and Reptiles in Tennessee....200
Slevin, Joseph R.
A Remarkable Concentration of Desert Snakes....12
Smart, Earl W. (see Woodbury, Angus M.)
Smith, Hobart M., and Leslie Burger
A New Snake (**Tantilla**) from Mexico....117
Smith, Philip W.
Thecadactylus rapicaudus in Honduras....55
Stahnke, Herbert L.
The Food of the Gila Monster....103
Stewart, George D.
Further Discusson of Head Bobbing in Snakes....101
Swanson, Paul L.
The Iguana **Iguana iguana iguana** (L)....187
Tanner, Wilmer W.
Notes on the Habits of **Microhyla carolinesis olivacea** (Hallowell)....47
Variation in the Scale and Color Pattern of the Wandering Garter Snake in Utah and Southern Idaho....194
Tschambers, Bert
Number of Young **Liodytes alleni**....48
Valcarce, A. C. (see Knowlton, G. F.)
Webb, Robert G.
Range Extension of the Chicken Turtle in Oklahoma....137
Werler, John E., and Donald M. Darling
Rhinocheilus lecontei tessellatus Garman in Tamaulipas, Mexico....112
A Case of Poisoning from the Bite of a Coral Snake, **Micrurus f. tenere** Baird and Girard....197
Woodbury, Angus M., and Earl W. Smart
Unusual Snake Records from Utah and Nevada....45
Woodbury, A. M., and Richard M. Hansen
A Snake Den in Tintic Mountains, Utah....66
Woodin, William H., III
Notes on Arizona Species of **Thamnophis**....39
Wright, Albert Hazen
Common Names of the Snakes of the United States....141

STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE KANSAS
LIBRARY
MAY 7 1954
MANHATTAN

HERPETOLOGICA

Established 1936

Organ of the HERPETOLOGISTS LEAGUE, A. A. A. S. Associate

President, Dr. Hobart M. Smith. Vice-President, Dr. Angus M. Woodbury. Secretary-Treasurer and Publisher, Chapman Grant, 2970 Sixth Avenue, San Diego 3, California. Edited by the Officers. Policies determined by the Members.

Vol. 6 March 8, 1950 Part 1

The Herpetofauna of the Tularosa Basin and Organ Mountains of New Mexico With Notes on Some Ecological Features of the Chihuahuan Desert

THOMAS HOWARD LEWIS

Mosauer (1932) has discussed the reptiles and amphibians of the Guadaloupe Mountains of New Mexico, while Little and Keller (1937) have examined the forms found in the Jornada Del Muerto. A collection made in the Tularosa Basin serves to compare material of an intermediate area and to augment herpetological knowledge in the border Southwest.

The undrained Tularosa Basin extends northward from Mexico between the Sacramento Mountains on the east and the Organ and San Andreas ranges on the west. In its southern portions it is typical of the creosote bush Chihuahuan desert. To the north are found the distinctive White Sands, and still further north the black lava "malpais." The marked effects of these latter environments on the coloration of animals have been pointed out by Dice and Blossom (mammals, 1937) and Bugbee (mostly invertebrates, 1942). Their study with regard to the lower vertebrates is planned.

The collections for the present survey were made about forty miles north of the Mexican border in a strip extending from the crests of the Organ Mountains downward and eastward to the lowest parts of the valley floor (Transitional to Lower Sonoran). The area is roughly that covered by the quadrangle maps "Parker Lake" and "Organ Peak" of the United States Department of the Interior, Geological Survey, 1941. Edition 1943, and specifically consists of T.22S., R.4 and 5 E., and T. 23S., R.4 and 5 E., New Mexico Base and Meridian, within the limits of Dona Ana County. Several distinct edaphic complexes are included. At the highest elevations (9082 feet-6000 feet), encinal plants sparsely clothe an exceeding rough and broken mountain ridge of upthrust, sculptured, igneous and sedimentary rocks. (Fig. 1).

STATE COLLEGE OF AGRICULTURE AND APPLIED SCIENCE LIBRARY MAY 6 1954 MANHATTAN, KANSAS

Representative Flora.

Pinus cembroides	*Nolina microcarpa*	*Pelluca* sp.
Pinus ponderosa	*Agave lecheguilla*	*Cheilanthes* sp.
Quercus (several sp.)	*Cercocarpus breviflorus*	*Acer* sp.
Phorodendron sp.		

The larger trees are restricted to the wind protected and better watered gorges (Fig. 2). The reptiles collected in this elevated belt were the very common *Urosaurus*, and occasional *Thamnophis* or *Bufo cognatus* near the ephemeral creeks.

The monolithic granite peaks of the Organ Range protrude from vast bajadas (Fig. 3) which slope far out into the valley. These alluvial fans, a mixture of huge boulders, smaller water-worn stones, and areas of sand, fine gravel, and earth, are deeply dissected by interconnecting dry washes.

Representative Flora.

Quercus (several sp.)	*Opuntia arborescens*	*Mimosa buncifera*
Juniperus pachyphloem	*Opuntia engelmanni*	*Dasylirion Wheeleri*
Ungnadia speciosa	*Abies concolor*	*Agave parryi*
Larrea divaricata	*Salix* sp.	*Agave lechguilla*

The writer wishes to express his sincere thanks to Mr. Charles E. Shaw and Mr. C. B. Perkins for their editing of the manuscript.

Fig. 1. Weathered granite surfaces at the highest altitudes in the Organ Mountains. *Urosaurus ornatus linearis* (Baird) was found here.

LIBRARY MAY 1954 MANHATTAN KANSAS STATE COLL. OF AGRICULTURE AND

Fig. 2. A stream bed at about 8,000 feet in the Organ Mountains.

Haplopappus laricifolius	*Echinocactus wislizeni*	*Brickellia* sp.
Fouquieria splendens	*Koeberlinia spinosa*	*Flourensia cernua*
Lippia wrightii	*Fendlera rupicola*	*Berberis trifoliolata*
Mammillaria sp.	*Condalia spathulata*	

The reptiles of the bajada are more numerous than those of the mountains. In approximate order of frequency are found *Urosaurus, Holbrookia, Cnemidophorus tesselatus, Masticophis t. taeniatus, Pituophis, Salvadora, Thamnophis,* and *Crotalus m. molossus.* Occasionally a collared lizard is seen this high. *C. tesselatus, M. t. taeniatus* and *C. m. molossus* appear restricted to this zone and were never encountered elsewhere. *Holbrookia* is confined to this and the next lower area.

The edges of the bajadas are relatively well watered tangles of bushy vegetation set around great piles of granitic boulders. From these thickets small trees follow the gorges upward into the mountains, and accompany the dry washes out onto the open flats. (Fig. 4).

Representative Flora.

Quercus sp.	*Rhus torreyi*	*Celtis Tala Gillies*
Salix sp.	*Condalia spathulata*	*Koeberlinia spinosa*
Minosa buncifera	*Fraxinus velutina*	*Guterresia Sarothrae*
Celtis reticulata	*Rhus microphylla*	*Vitus arizonica* (high gorges)
Celtis laevigata	*Morus microphylla*	

The most dense reptile populations are in this border zone between the bajadas and the open desert, but no genera except possibly *Diadophis* are restricted to it. We collected *Terrepene, C. atrox, P. cornutum, Cnemidophorus t. tigris,* and *C. perplexus, Crotaphytus, Holbrookia, Urosaurus,* and *Bufo punctatus.* This is the lowest level inhabited by *Urosaurus* and *Holbrookia.*

From the edges of the alluvial fans a gentler and smoother slope extends between the 4300 and 4000-foot contours. These slopes are also stream built and show yucca-mesquite-ephydra-grassland associations (Fig. 5 and 6) interspersed between areas of creosote bush desert. The creosote (*Larrea divaricata*) forms pure stands on bare gravelly soil and is virtually devoid of associated reptiles except where diluted by other plants. The non-creosote portions of this zone support, beside the grasses, the following:

Yucca elata	*Koeberlinia spinosa*	*Zinnia grandiflora*
Prosopis juliflora (dominant)	*Lycium Torreyi*	*Cassia bauhinoides*
Ephydra trifurca	*Hymenoclea* sp.	*Baileya multiradiata*
Cucurbita foetidissima	*Opuntia engelmanni*	*Artemesia filifolia*
Haplopappus pluriflorus	*Eschscholtzia californica*	*Triodia pulchella*
Flourensia cernua	*Zinnia pumila*	*Suaeda torreyana*

STATE COLLEGE OF AGRICULTURE AND LIBRARY MAY 6 1-24 MANHATTAN KANSAS SCIENCE

The dry waddies (Fig. 7) of this zone are bordered by:

Acacia constricta	*Mimosa buncifera*	*Erigeron flagellaris*
Gutierrezia Sarothrae	*Hymenopappus* sp.	*Sphaeralcea hastata*
Gutierrezia lucida	*Aster tanicetifolia*	*Tidestromia lanuginosa*
Chilopsis linearis var. *arcuata*	*Amaranthus palmeri*	*Apodanthera undulata*
Solanum elaeagnifolium	*Eriogonum annum*	*Haplopappus tenuisectus*
Datura sp.	*Dalea scoparia*	

The reptiles restricted to the yucca grassland zone are:

Sceloporus u. consobrinus	*Eumeces obsoletus*	*Rhinocheilus l. tessellatus*
Sceloporus m. magister		

Also found, but not exclusively here, are the largest number of genera and species of any zone.

Uta s. stejnegeri	*Cnemidophorus perplexus*	*Pituophis* sp.
Bufo cognatus	*Crotaphytus w. wislizenii*	*Salvadora h. deserticola*
Bufo punctatus	*Crotaphytus c. baileyi*	*Arizona e. philipi*
Scaphiopus hammondi	*Phrynosoma cornutum*	*Elaphe subocularis*
Cnemidophorus tigris tigris	*Masticophis flagellum testaceus*	*Terrepene ornata*

At about the 4000-foot contour, dunes of fine loose sand appear, (Fig. 8) mostly fixed in place by crowns of mesquite or salt bush (*Atriplex canescens*). *Uta* and *Phrynosoma modestum* are almost completely confined to this dune association. Occasional inhabitants are

Fig. 3. Edge of a bajada, or alluvial fan. Sotol and acacia in the foreground.

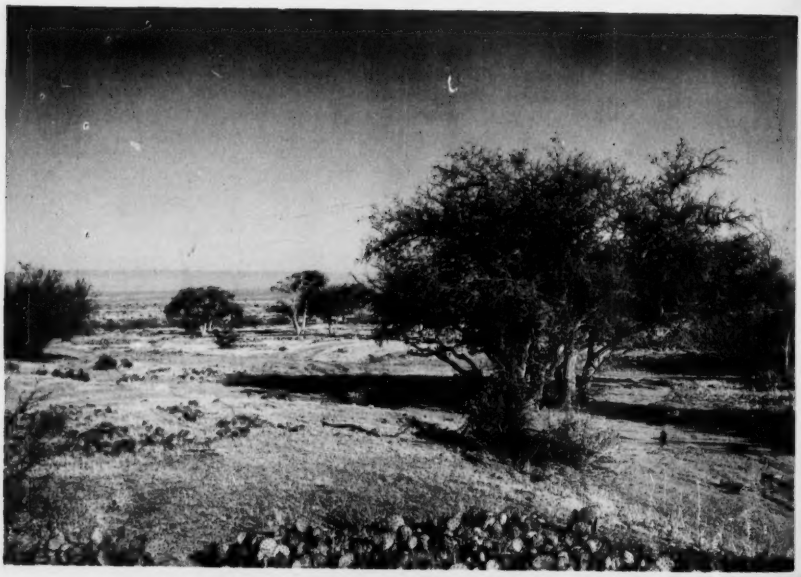


Fig. 4. Hackberry trees between the foothills and the open desert.

Cnemidophorus t. tigris, Crotaphytus w. wislizenii, Sceloporus m. magister, and *Crotalus v. viridis.*

The dunes are succeeded, as one gradually descends, by playas dotted with ephemeral salt lakes, gypsum deposits, and outcroppings of caliche. The *Atriplex and Allenrolfea occidentalis* association characterizes this lowest portion of the basin (3900 feet), supplemented by a wide variety of annual Compositae (*Helianthus ciliaris, Pectis papposa, etc.*). *Uta, Cnemidophorus, t. tigris, Masticophis f. testaceus, Crotalus v. viridis,* and *Heterodon* were collected here. In the temporary ponds or artificial earthen "cattle tanks" *Bufo, Scaphiopus,* and *Ambystoma* were found.

The collection described was obtained 1947-1949. It represents over 350 specimens, and is now at the Puget Sound Museum, College of Puget Sound, Tacoma, Washington.

Ambystoma tigrinum mavortium Baird

Axolotls were common in shallow cattle watering ponds on the valley floor (Haystack Tanks, Big Tanks). These muddy pools are dry several times a year, but soon after they are re-filled by rain, larvae can be found. Adults are uncommon, one being seen in October, one in July.

The stomachs of the larvae contained masses of organic matter, nicely separated from mud and debris. Aquatic insect larvae were the most commonly identified food, followed by fragments of corixids, small nematodes and flukes, copepoda (*Diaptomus*), ostracoda, and cladocera. Some immature salamanders confined to aquaria transformed very rapidly (within eight days), while others of equal size retained larval form. Breeding adults or eggs were not observed.

Bufo cognatus (Say)

Many metamorphosing and adult individuals were found in temporary lakes and ponds in late September and early October of 1947. Tadpoles were also taken high in the Organs in Johnson Canyon. In 1948 they were breeding in stock tanks and ditches with *Scaphiopus* (May) and *Bufo punctatus* (July). Gravid females were taken as late as September 7, 1948.

Bufo punctatus Baird and Girard

This species was breeding in roadside ditches in early July, 1948. Later in the same month metamorphosing juveniles were common. The habit of floating limp and belly up, as though lifeless, was often noticed in frightened adults.

Bufo insidior Girard

This little green toad is found, but very infrequently, around mud holes at the lowest levels of the basin floor. Four specimens were obtained from Haystack Tanks.

Scaphiopus hammondii Baird

These toads were breeding from late May through early September, whenever temporary water appeared. A large albino tadpole was taken July 2, 1948, as well as a number of normally pigmented larvae.

Sceloporus undulatus consobrinus Baird and Girard

This lizard is most often seen on the banks of dry water-courses in the open plains, where it can take refuge in mammal holes or beneath masses of gourd vines.

Sceloporus magister magister Hallowell

This species is practically confined to the yucca-mesquite association. It is relatively uncommon. When hidden from the collector it can sometimes be lured out by tossing small pebbles along the ground. Apparently mistaking these for moving insects, it rushes forth to seize them momentarily in the mouth. This stratagem can be repeated until the lizard is in range of the hand.

Urosaurus ornatus linearis (Baird)

This ubiquitous lizard is very common from the highest levels to the edge of the plain, wherever large rocks or trees provide cover. It is often seen bobbing alertly up and down on all four legs, or dodging around a tree trunk or boulder. On April 26 and 27, 1948, during a walking trip thru the Organ Mountains, many courting pairs were seen, from the foothills to the 8000 ft. summits. Actual copulation was not observed. Males were fighting vigorously, showing the brilliant blue belly patches and distensible pale green throat in the preliminary feints.

Fig. 5. Yucca-mesquite-grassland association.

Fig. 6. Mesquite and yucca in the coarse sand desert, with the Organ Mountains in the background.

Uta stansburiana stejnegeri Schmidt

This small lizard is common in the mesquite-capped dunes and in the lower levels of the yucca association. It is not encountered above 4100 ft. We observed courting and mating activities on April 28, 1948. The day was hot, and very windy, violent dust storms sweeping every few minutes over the valley floor without seeming to hinder lizard activities. The first newly-hatched young were seen August 4, 1948. *Utas* were seen on sunny days throughout the winter.

Holbrookia texana (Troschel)

Fourteen specimens were examined, the largest of 740 mm. snout-vent length. *Holbrookia* is found in the rocky foothills and alluvial fans. It is a wary lizard, very fast, and most successful at eluding capture unless a gun is used. The local forms differ somewhat from published descriptions in that the lateral black bars are bordered by brilliant green, rather than yellow or orange, and in the absence of blue on the belly. Large males, in addition to these features, show a faint flush of pink on the throat, yellow chest, abdomen, and ventral surfaces of anterior limbs, metallic blue-gray on head and nape, changing over the shoulders to alternating bars of gray and orange, which curve laterally and caudally from the midline. In the field the males appear metallic-iridescent dorsally.

The first young were seen July 25, 1948.

Cnemidophorus tigris tigris Baird and Girard

This is a common lizard in sandy mesquite and yucca areas or on alkali flats, but is not found in the mountains, or in the rough foothills. When pressed, it runs at great speed, with the tail held in the air, and apparently bipedally. Usually, however, it moves quietly from one side of a mesquite bush to another, and deserts this thorny shelter rapidly, quietly, and from the farthest corner, leaving the collector to beat an empty bush. One large specimen measured 104 mm., snout-vent, tail 260 mm. The throat was pinkish with black fragment-like spots, chest orange, abdomen and tail yellow with black spotting. Many specimens show orange abdomens, especially in the caudal two-thirds and more or less pink suffusion of throat. The first juveniles were seen July 17, 1948.

Cnemidophorus perplexus Baird

Four specimens are referred to this designation. They show the same habitat preferences as *tessellatus*.

Cnemidophorus tesselatus (Say)

One specimen was shot on a rocky alluvial fan east of Texas Canyon at about 4900 ft. I have not collected it at lower levels.

Crotaphytus wislizenii wislizenii Baird and Girard

Eleven speciments of this large and spectacular lizard were collected. My observations indicate that it establishes a home burrow to which it can be expected to return regularly. The mesquite-crowned dunes in mid-valley are often occupied by a leopard lizard and one or more Utas. The leopard lizard attempts escape when pursued by running a zigzag course at high speed for several hundred feet, stopping in the shade of low bushes. Once immobilized, they permit the collector to approach within a few feet.

The largest individual examined was 120 mm. snout-vent, 190 mm. tail. The ventral surface of the tail was intense orange, the same color being distributed in large lateral spots on head and body. Smaller individuals did not show this orange coloration.

Crotaphytus collaris baileyi Stejneger

These large lizards are found most often at the edge of the foothills. They take refuge in the jumbled rock of the locale, or in mammal burrows. Bipedal locomotion seems to be maintained at even fairly slow rates of speed. I have caught them by hand, by stalking very slowly. The largest collected was 92 mm. snout-vent length, 158 mm. tail.

Eumeces obsoletus (Baird and Girard)

Only one specimen of this sleek, smooth-scaled lizard was obtained. It was dug from a burrow beneath a large yucca, near the edge of the foothills at the mouth of Ash Canyon.

Phrynosoma cornutum (Harlan)

Phrynosoma is not as common as the less specialized lizards. It accepts a wide variety of habitats, refusing only the mountains. Hibernation terminated about April 15, in 1948. A

Fig. 7. A dry wash, bordered by yucca, acacia, and a variety of flowering annuals.

Fig. 8. Mesquite-crowned sand dunes, habitat of *Uta stansburiana stejnegeri*.

copulating pair was observed at dusk April 22. The male was perched upon the back of the female with the right hemipenis inserted into the left side of the female's cloaca. This position was maintained quietly for about thirty minutes, when a movement of the observer caused the lizards to separate, the male running off with the turgid, purplish, hemipenis dragging. The first young of year were seen August 8, 1948.

Phrynosoma modestum Girard

One freshly hatched juvenile was captured in the sand dunes August 21, 1948. Several adults were also taken near West Dry Lake Tank.

Leptotyphlops humilis segrega Klauber

A specimen (Field No. 286) was collected July 10, 1949, in a fresh excavation near Cox Ranch. This individual serves to extend the range of the subspecies at least 230 miles to the northeast from Brewster County, Texas (see Stejneger and Barbour, 1943) and is the first record for New Mexico. The absence of supraocular scales and the presence of ten scale rows on the tail serves to distinguish it from the New Mexican blind snake (*Leptotyphlops dulcis dissecta* Cope) and the Texas blind snake (*Leptotyphlops dulcis dulcis* Baird and Girard). The dorsal color is pale brownish pink and unmarked. The ventral color is a translucent, slightly iridescent pink.

Masticophis taeniatus taeniatus (Hallowell)

One specimen was observed in the early evening moving rapidly through mesquite and cactus high on an alluvial fan. It proved to be a definite intergrade between *Masticophis taeniatus taeniatus* (Hallowell) and *Masticophis taeniatus girardi* Stejneger and Barbour. There were slight indications of cross-barring behind the head. The ventral surface of the tail was brilliant old-rose color. Total length was 11.2 cm., tail 33.8 cm., supralabrals 8, infralabials 9, ventrals 207, caudals 134.

Masticophis flagellum testaceus (Say)

Eight specimens were collected. Ortenburger (1928) has discussed the possibility of defining a New Mexican subspecies, on the basis of differences which are also demonstrated by these individuals (ie. increased number of ventrals and caudals, color).

Pituophis catenifer Intergrades

Gopher snakes are the most common and largest ophidians. The specimens from this locale, on the line of intergradation, show features of *P. c. affinis* and *P. c. sayi*. The rostral plate is usually much higher than wide, as in *sayi*. The coloration is most often nearer that of *affinis*. Out of nine specimens, two could, if seen individually, be called *affinis*. The remainder would key out fairly well to *sayi*.

Salvadora hexalepis deserticola Schmidt

I refer the four specimens examined to this sub-species. However, the narrow black lateral line is found on scale rows 3 and 4, not confined to scale row 4 as described by Schmidt (1940).

Arizona elegans philipi Klauber

One badly mangled DOR adult was examined, from Globe Springs Ranch. Two newly hatched young were taken at night August 26, 1948. Like many specimens of *Masticophis*, they bit viciously whenever handled. Color and pattern were similar to the adults. Length (snout-vent) of one was 245 mm., tail 42 mm.

Thamnophis eques cyrtopsis (Kennicott)

We found two specimens swimming in a small creek at about 6000 ft. in Ash Canyon.

Elaphe subocularis (Brown)

One specimen, a state record, has been reported previously.

Rhinocheilus leconti tessellatus Garman

Six specimens of this beautiful red, yellow, and black snake were collected along asphalt roads at night. The local vernacular name, "thunder and lightning snake" refers to their seemingly greater abundance during nocturnal thunder storms.

Lampropeltis getulus splendida (Baird and Girard)

One large adult was brought to me after being found in a storeroom in late October, 1948.

LIBRARY MAY 8 1954 MANHATTAN

Diadophis regalis regalis (Baird and Girard)

One DOR collected in August, below Texas Canyon Spring, had a total length of 570 mm., tail length 95 mm. No nuchal ring was present. The ventral surface was orange anteriorly, changing to scarlet posteriorly.

Heterodon nasicus kennerlyi Kennicott

One large specimen was found in mid-morning in a dry lake bed at Davies Tank.

Crotalus atrox Baird and Girard

This is the most common member of the genus. Twenty-two specimens were preserved, the stomach of one containing a large *Cnemidophorus*. This snake was seen abroad even in the cold weather of late November. During the hot months all members of the genus are nocturnal, and like many other snakes, were most easily collected during nocturnal convectional storms. The local name for *atrox* is "coon-tail rattler."

Crotalus viridis viridis (Rafinesque)

Three specimens were collected. The species seems to prefer the open playas and valley floor more than the alluvial fan and foothills frequented by *C. atrox*. A 23.7 cm. juvenile of the year was collected on a chilly day in mid-October.

Crotalus molossus molossus Baird and Girard

Two specimens were taken at about 4600 ft. in the rocky foothills. Local people call it the "green rattler" and say it is only to be found in the mountains.

Terrepene ornata (Agassiz)

These tortoises were common DOR's after rains, or in cloudy weather. We did not collect them above the 4300 ft. mark.

REFERENCES

Bugbee, Robert E. 1942. Notes on animal occurrence and activity in the White Sands National Monument, New Mexico. Transactions Kansas Academy of Science, 45:315-321, 1 Map, 1 fig.

Dice, Lee R., and Philip M. Blossom. 1937. Studies of mammalian ecology in Southwestern North America with special attention to the colors of desert mammals. Carnegie Institute of Washington, Washington, D. C., pp. i-iv, 1-129, 8 pls., 8 figs.

Klauber, Lawrence M. 1947. Classification and ranges of the gopher snakes of the genus *Pituophis* in the western United States. Bulletin of the Zoological Society of San Diego, 22:1-81, 6 figs.

Lewis, Thomas H. 1948. *Elaphe sclerotica* in New Mexico. Herpetologica 4 (6):223.

Little, Elbert L., and J. G. Keller. 1937. Amphibians and reptiles of the Jornada Experimental Range, New Mexico. Copeia, No. 4:216-22.

Mosauer, Walter. 1932. The amphibians and reptiles of the Guadalupe Mountains of New Mexico and Texas. Occasional Papers Museum of Zoology, University of Michigan, No. 246:1-18, 1 pl.

Ortenburger, A. I. 1928. The whip snake and racers. Memoirs University of Michigan Museum, No. 1, i-xviii, 1-247, 64 figs. 36 pls.

Ruthven, A. G. 1907. A collection of reptiles and amphibians from southern New Mexico and Arizona. Bulletin of the American Museum of Natural History, 23:482-604, 22 figs.

Schmidt, Karl P. 1940. Notes on Texas snakes of the genus Salvadora. Zoological Series Field Museum of Natural History, 24 (12):143-150, 3 figs.

Smith, Hobart M. 1946. Handbook of lizards. Comstock Publishing Co., Inc., pp. i-xxi, 557 pp. 136 figs. 41 maps, 134 pls.

Stejneger, Leonard, and Thomas Barbour. 1943. A check-list of North American amphibians and reptiles. 5th ed. Cambridge, Harvard University Press, pp. i-xx, 1-260.

Tanner, Vasco M. 1939. A study of the Genus Scaphiopus: The Spadefoot Toads. The Great Basin Naturalist, 1(1):33-26, 3 pls.

Las Cruces, New Mexico.

COURTSHIP AND COITION OF THE DESERT TORTOISE

By Vic H. Housholder

I had the rare opportunity of observing the desert tortoise courtship through to coition on the evening of August 13, 1949, at Phoenix, Arizona. The event occurred on my back lawn. The courtship started on the grass and coition was consummated on dry soil *one hour and six* minutes later. The courtship was not greatly different from that described by Woodbury and Hardy (Ecol. Mon., 1948:167) but so far as known this is the first report of coition.

I placed the pair, the female which I have had over two years and the male for only two weeks, facing each other about six inches apart. The male immediately began thrusting his head full-neck length forward with a bobbing action. There was no evident response from the female, but at once the male moved forward touching the female on her nose with his nose. This happened perhaps a half dozen times when the female turned sideways with the male right beside her. They then started a circling action, with the female merely pivoting in her position and the male encircling her. This continued for perhaps twenty times, when the male got in front of the female attempting to bite her right front leg, her nose, and edge of the shell.

Views of two tortoises in process of courtship. The third view shows the male nearly in position for coition.

With this she turned and began pivoting in the opposite direction. This action continued for a long period, perhaps thirty minutes. Finally the male became quite pugnacous with his biting, getting hold of the claws on the right front foot three times, during which he raised the forward portion of the female perceptibly from the ground. It was at this time that the female showed the first evidence of response and very quickly the male mounted the female on her right side. In attempting to move around to the rear, the male slid off, but immediately began his courtship tactics all over again. This did not last long this time, coming to an abrupt halt with the male mounting at the rear.

The female made no effort to get away, but busied herself with eating green bermuda grass. The male assumed an almost vertical position with his front feet resting about midway on the carapace of the female. (I should say here that the two individuals are about the same size).

The male immediately began a vertical pumping action in which the pygal scutes struck the ground with a resounding blow. At the same time his head was extended forward (horizontally—full-neck length) and with each pump he emitted a very audible puffing or blowing or grunting noise. (Subsequent repetitions of this act have revealed a definite *vocal* sound with pitch and tone.) This action continued for another half hour, during which time his tail was extended forward many times. The female did not move at all during this entire process other than to move her fully extended head and neck quite briskly from side to side.

In a short time the cloaca of the female seemed to extend greatly and turn inside out. The male did not respond and the female withdrew her genitals. This happened three times before the male fully responded and contact was made. At this point the male, still erect, withdrew his head completely within his shell, but continued his vertical bobbing. Actual contact continued for about five minutes, when the female moved forward and the male slid off to the left side and just lay there, a very limp and thoroughly spent individual.

The female moved forward a few feet and resumed her browsing. The male remained inert for several minutes and then slowly moved off in another direction. I examined both individuals and found both cloacas entirely soppy wet. By taking hold of the tail of the male, I was able to open the cloaca and found it quite full of a thick, white liquid substance. Nothing was discernible in the cloaca of the female or for an inch or more all around it, although it was wet.

A REMARKABLE CONCENTRATION OF DESERT SNAKES

By Joseph R. Slevin

In March, 1940, the late Mr. Wallace Wood brought to me fifty-six Vermilion Striped Ground Snakes (*Sonora semiannulata linearis*) and thirteen Desert Worm Snakes (*Leptotyphlops humilis cahuilae*) which he had taken at Laguna Dam, Imperial County, California, while engaged in trapping mammals. He remarked that he made no special effort to collect these snakes but merely picked them up at odd times while he was engaged in his trapping. *

I jumped at the opportunity offered when he invited me to accompany him the following spring to thoroughly investigate the locality where he had taken these specimens.

Through the courtesy of the Yuma Reclamation Service the latter part of April, 1941, the 21st to be exact, found us camped on the small spit of land formed by the cut made for

Fig. 1. General view of the spit at Laguna Dam, looking down from a hilltop on the mainland. Photograph by Wallace F. Wood.

Fig. 2. The trail along the spit, extending from the grove of cottonwoods to the opposite end. Here the worm snakes were found on the surface at night while hunting with the aid of a gasoline lantern. Photograph by Joseph R. Slevin.

Fig. 3. The rubble seen covering the embankment along the trail furnished cover for the snakes. By raking this over several at a time were often uncovered. The best time for hunting was found to be the early morning before the sun heated the rocks, forcing the snakes to retreat further underground. Photograph

* An account of his stay at Laguna Dam is given in Copeia, No. 3, October 15, 1945, p. 177.

installing the gates of Laguna Dam. Unfortunately we were unable to obtain a map of this particular piece of land nor were any figures as to the exact size available, so it will have to be described as a spit of land approximately 500 yards in length and about 40 yards in width at the widest point. A small grove of cottonwoods is situated at one end of it, the rest being covered with mesquite trees and with a heavy growth of willow and arrowweed bordering the edges.

In such a limited area it was not difficult to pick out the most likely spots for hunting, and after making camp and looking over the situation in general picked up three worm snakes and a striped ground snake as a beginning. Next morning we started out early before the sun got too warm and by noon had twenty-six striped ground snakes, ninety-nine worm snakes and four milk snakes (*Lampropeltis getulus yumensis*). The following day, April 23, netted thirty-six worm snakes and twenty-seven striped ground snakes. On the 24th, three worm snakes were taken and on the 25th, one, these days being given over to working the mainland.

In May, 1947, while passing through Yuma, Mr. Wood and myself made a short visit to Laguna Dam more to see the keeper than to hunt, but during the couple of hours there secured four worm snakes and six striped ground snakes. Our last visit, in May, 1949, was given to observing night activity and seventeen worm snakes were taken by hunting along the open trail with a gasoline lantern.

In the soft, silty soil, in the cottonwood grove worm snake tracks were seen everywhere, but no snakes, their activity above ground evidently being very limited. Captive worm snakes were let loose in a large iron tub to make sure of the type of track these snakes made and from observation it was found that, according to the tracks on the surface, they must have been very numerous under the ground.

One other species a Desert Spotted Night Snake (*Hypsiglena torquata deserticola*) was added to the list of species, it being picked up while crossing the open trail which extends the length of the spit. A red Racer (*Masticophis flagellum piceus*) taken on a previous trip by Mr. Wood makes a total of five species of snakes and a grand total of 229 taken in this extremely restricted area.

A NEW SUBSPECIES OF THE MUD SNAKE, Liodytes alleni

By Walter Auffenberg

The genus *Liodytes* is composed of but one species, which, with the exception of the Floridian Keys, is mainly endemic to the Florida peninsula. Due to its rather secretive inclinations the natural history and taxonomy of the species was unknown for some time. Later studies made by Archie F. Carr Jr. and O. C. Van Hyning greatly clarified the natural history of this species. Both workers examined large numbers of specimens from rather restricted localities in central Florida. Contrary to earlier views it became apparent that this snake was quite common, although possibly spotty in occurrence. Much recent work has substantiated these accounts. Mr. Ross Allen of Silver Springs has informed me that large numbers of *Liodytes* were taken while seining for *Siren* in the drainage ditches near Lake Okeechobee. Also R. Etheridge and D. Tinkle, both of Tulane University, have written me that during a rainstorm they took fourteen specimens while crossing the causeway over Payne's Prairie. Such observations show that the general lack of large series of this serpent from various localities was due, not to the rarity of the species, but rather to the lack of knowledge essential to collecting them. The presence of water hyacinth makes collecting for this species easier. The greatest concentration of the plant is found in central Florida, which has made the locality lists for this area nearly complete, whereas other areas with scanty hyacinth have few or no records. The extreme southern tip of the peninsula was such an area with but few locality data, which made the discovery of a new form probable.

In May, 1948, I received from Mr. L. H. Babbitt of Petersham, Mass., a specimen of *Liodytes alleni* from the southern portion of the Florida peninsula which appears sufficiently distinct to warrant subspecific designation. Since then 10 more specimens have come to my attention, three of which I have used as paratypes. The new form may be termed:

LIODYTES ALLENI LINEAPIATUS subsp. nov.

Everglades Swamp Snake

TYPE—W. Auffenberg collection 3119, adult male collected March 15, 1948, 15 miles southwest of Miami, Dade County, Florida, by L. H. Babbitt.

AGRICULTURE AND APPLIED SCIENCE LIBRARY 1954

DIAGNOSIS—Differs from typical *alleni alleni* in having a row of very distinct midventral black spots, or an indistinct line as in specimens from the vicinity of the Royal Palm State Park.

DESCRIPTION OF TYPE—Body moderately stout, tapering from mid-body. Head small, narrow and elongated, not distinct from the neck. Rostral truncate, wider than high. A single internasal, its apex directed forward, rounded posteriorly, slightly wider than long. Frontal twice as long as wide. A pair of prefrontals wider than long and extending downward to, and in contact with, the loreal. Nostril situated in a divided nasal on the line of suture between them. The prenasals in contact medially over the rostral, the posterior separated from the preoculars by a loreal and a prefrontal. A single preocular and 4/3 postoculars. Supraoculars narrow, slightly more than twice as long as wide. Parietals extending downward over the temporal region and separated from the supralabials by the anterior portion of a long temporal. A single loreal, in contact with the 1st and 2nd supralabials. Supralabials 8/8, the 4th entering the eye infralabials 9/9. Temporals 1-2, the anterior very long and narrow, twice as long as broad. Mental scale not in contact with the chin shields, of which the posterior pair is the longest. Eye one-half its diameter from the mouth. Scales smooth, except on the dorsal surface of the tail and the supra-anal region, where they are strongly keeled in 19-19-17 rows. Ventrals 127; anal scute divided; subcaudals 65, divided; 8 scale rows at mid-tail. Scale reduction to 17 rows occurs by dropping the 2nd row at about the 114th ventral. Males only have this reduction.

Coloration in formalin: (Fig. 2) Iridescent, glossy, brownish-black, with four lighter stripes, the vertebral stripe obscured or faded. The two dorsal stripes are the darkest, being dark brownish-yellow and two scales wide; the lateral series are lighter, and two and a half to three scales wide. The dorsal stripes are separated by 4 rows of ground color. Ventrally it is yellowish, with a row of mid-ventral black spots on each scute starting on the 23rd, and extending to the anal plate. A blackish stripe extends medially on the subcaudals from the anal plate to the tip of the tail; the two light stripes on the tail are continuations of the dorsal stripes, while the lateral series end 5 scales posterior to the anal scute.

PARATYPES—The following specimens are designated as paratypes:

Ross Allen Collection 41-H, 7 miles south of "20 mile bend," Broward County, Florida, October 15, 1948. Collected for R. Allen by G. W. Battey.

Ross Allen Collection 41-I, Lakeport, Glades County, Florida. October 1, 1948. Collected for R. Allen by Otto Whidden.

Royal Palm State Park Collection 217, 5 miles east of Paradise Key on Ingraham Highway, Dade County, Florida.

VARIATION AMONG THE PARATYPES—The degree of roundness on the posterior edge of the internasal seems quite variable, some specimens having as angulate a posterior as anterior edge. The postoculars were 3/3 in all specimens, but the parietals were in contact with the supralabials in RA 41-I. Supralabials were either 8/8 or 9/8. The 3rd and 4th supralabials entering the eye in all specimens but one, where only the 3rd entered the eye. The scales on the supra-anal region are distinctly keeled in most male specimens, usually absent in females. The scales are always keeled on the dorsal surface of the tail. The ventrals range from 123-128 subcaudals 54-58. The scales in 19-19-17 rows in males and 19-19-19 in females, the reduction, when present, taking place opposite the 12-14 ventral anterior to the anal plate, 7-8 scale rows at mid-tail. All other scale characters as in the type. The coloration varied from very dark brownish-black to black. Vertebral light stripe faintly visible in RPSP 217. Ventrally the spots are always very distinct, but RPSP 217 again shows variation in that the spots are quite elongated and practically fuse to form a line down the center of the belly. The ground color of the belly is also different from that of the other specimens, being much darker in general appearance and heavily stippled across the width of each scute (Fig. 1).

RANGE—Southern Florida; central Glades County to extreme south Florida, excluding the Floridian Keys. It has been recorded from the following counties: Dade, Glades, Broward, and Collier. Further collecting in Monroe, Palm Beach and Hendrey Counties should show that the form inhabiting those areas is *lineapiatus*. Carr records *Liodytes* from Charlotte, Okeechobee, and Palm Beach Counties. The two former counties are probably in the area of intergradation. The latter county is within the range of the new form. Unfortunately I have been unable to locate these specimens. USNM 21388, which appears to be an intergrade, is labeled "probably Oakland, Florida." This seems in error. I base this on ventral coloration. This specimen has, to a certain degree, the spotted ventrum of *lineapiatus*, but as the locality is so far removed from this form's range, and as the locality data is a probable record, and as

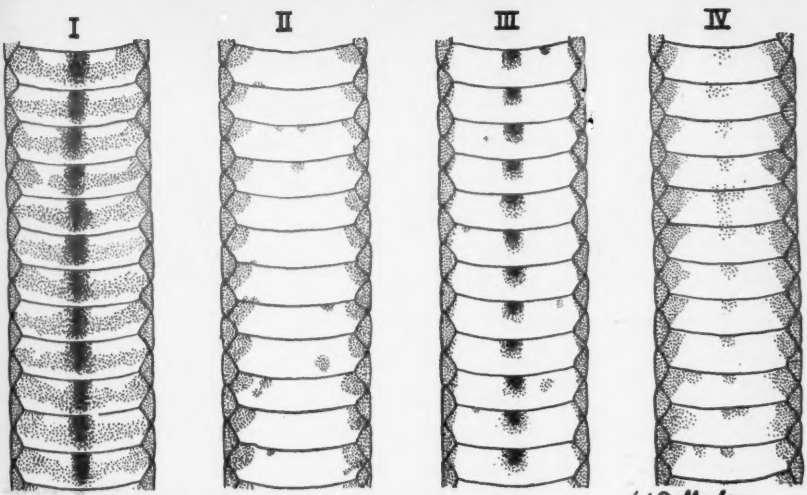
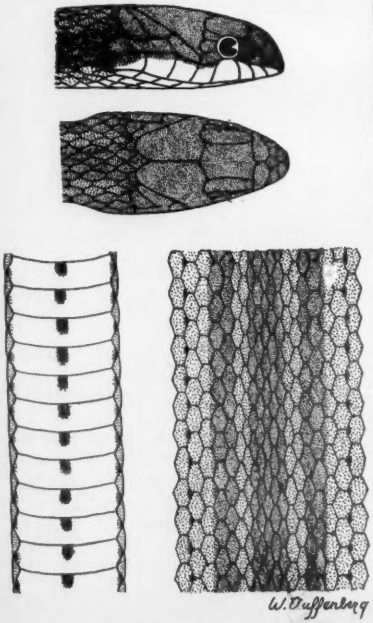


Fig. 1. Variations in ventral coloration of *Liodytes alleni*. I. *L. a. lineapiatus*. RPSP 217, 5 miles east of Paradise Key on Ingraham highway, Dade County, Florida. II. *L. a. alleni*. WA 3221, 12 miles southeast of Pierson, Volusia County, Florida. III. *L. a. lineapiatus* RA 41-1, Lakeport, Glades County, Florida. IV. USNM 69669, near Eustis, Lake County, Florida.



g. 2. Head, dorsal, and ventral aspects of *Liodytes ui lineapiatus*. Type specimen, WA 3119, 15 miles southwest of Miami, Dade County, Fla.

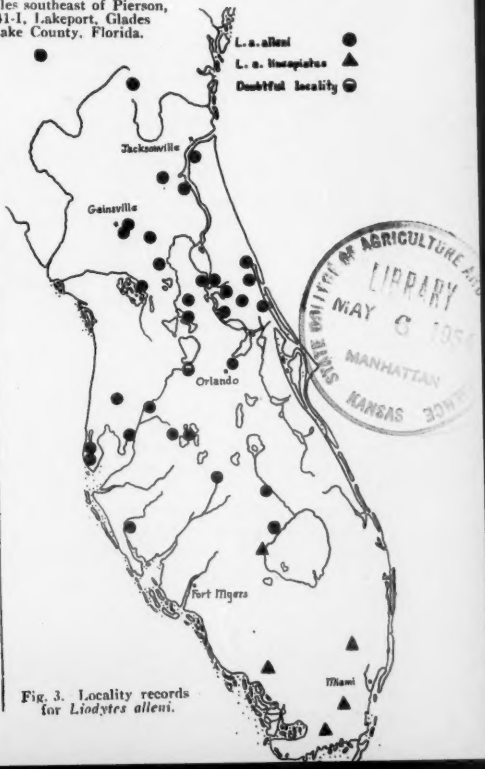


Fig. 3. Locality records for *Liodytes alleni*.

intervening localities have typical *alleni* present, I am forced to conclude that the locality information is in error (Fig. 3 for all locality records). A specimen in W. T. Neill's collection is definitely an intergrade, but just labeled "Florida." I believe, however, that the form will be found to intergrade with *alleni* in southern Charlotte or Lee, northern Glades, and southern Martin, or northern Palm Beach Counties.

MORPHOLOGY OF THE SPECIES: The largest specimen of *alleni* measured was 652 mm. in total length, a female. The largest male measured 600 mm., with an average length for this subspecies of 401 mm. For *lineapiatus* I have taken the following measurements: largest female 532 mm. largest male 420 mm., and an average length for the subspecies of 356 mm. In the head-total length measurements *alleni* and *lineapiatus* have approximately the same ratio, but with the few specimens of *lineapiatus* available it seems that the latter has a narrower, if not longer head than *alleni*.

In *alleni* the palatine teeth vary from 27-32, with 23-26 mandibular teeth and 12-15 maxillary teeth. In the type specimen of *lineapiatus* I find 31 palatine, 25 mandibular, and 15 maxillary teeth, showing no great difference. The teeth are conical, of small diameter throughout, and not too recurved, the points being directed more superior than posterior.

ECOLOGICAL PREFERENCES—Carr states that he believes *Liodytes* to be the most aquatic Florida snake. This I believe to be quite true. Although specimens are sometimes killed on the highways, the prowling is most often done during the night, or during a rainfall or heavy dew. They are found in practically all aquatic situations except brackish or salt water. The most favored habitat, however, is fresh water marsh or shallow lakes where the bottom is mucky with a profusion of hydrophytic plants either on the surface, or on the bottom. The general inclinations seem to be towards shallow water, and they are commonly taken from the matted roots of floating plants, as water hyacinth. Carr also states that specimens were taken from burrows in a mucky bank in Lake County, Florida. In winter he reports them as being found in deep sphagnum bogs and I have occasionally caught them under rotten cypress logs in a marsh in Volusia County, Florida. Fresh water marshes, canals, sloughs, open hyacinth "prairies," shallow lakes, and drainage ditches are the most frequent habitats, although they are occasionally taken in larger lakes, cypress ponds, streams of varying sizes, and flat woods ponds. With the advent of more and more drainage projects being undertaken in Florida, it is very possible that this species may become uncommon, although at present drainage ditches seem a natural selection. Drained land, however, definitely discourages inhabitation by these serpents.

Although specimens have been taken at most hours of the day, the majority seem to have been taken while at rest. The species is crepuscular to some extent and Ross Allen informs me that he has seen them lying in shallow water at night. Etheridge and Tinkle have taken them during a rainstorm, and I have seen them prowling during heavy dews and showers. Cooper mentions individuals sunning themselves on the banks of Payne's Prairie during early spring. Accordingly, twilight and night must be when the species pursues its prey, while rainstorms and heavy dews afford an opportunity to prowl upon the surface of the ground. The species has not been observed to sun itself except in the spring.

Unfortunately I am unable at this time to make any gross statements as regards the temperature-prowling activities, as the number of live specimens which I have taken while prowling are few. I observed two specimens prowling across a road in Volusia County when the temperature was 65 degrees F.

FOOD—The only food thus far established as being taken by *Liodytes* is *Cambarus*, *Pseudobranchus*, and various frogs, as recorded by Carr and O. C. Van Hyning. These studies were made on large numbers of *alleni alleni*. I found no remains of food in two specimens of *lineapiatus* which I have dissected.

ACKNOWLEDGEMENTS—I wish to thank the many friends and colleagues who have helped in the completion of this paper. In particular I wish to acknowledge the time and patience given to this work by Mr. Ross Allen of Silver Springs, Florida, who sent specimens and information on habits to me. Among others to whom I am indebted, for loan of specimens and suggestions pertaining to this paper, are Dr. D. Cochran, K. P. Schmidt, C. J. Goin, B. M. Cooper, R. Etheridge, C. M. Bogert, D. Tinkle, G. Van Duyn, J. Brown, F. H. Seaton, L. H. Babbitt, Dr. A. M. Winchester, B. Alexander, W. T. Neill, Mrs. W. Auffenberg, D. L. Fuller, J. Morgan, and the Everglades Park Commission.

LITERATURE CITED—Carr, Archie Fairly Jr. 1940. A. Contribution to the Herp. of Fla., *Univ. of Fla. Pub.*, Biol. Sci. Ser., Vol. III, No. 1, Jan. 1940.

Van Hyning, O. C. 1932. Food of some Fla. Snakes. *Copeia*, 1932, Vol. I, p. 37. 1933. Batrachia and Reptilia of Alachua Co., Fla. *Copeia*, 1933, Vol. I, pp. 3-7.